Claims

1. Dendrimeric polymers with symmetric chemical structure and non-symmetric hyperbranched polymers, which are modified in order to contain:
- at least one atom of a chemical element able to form three or more chemical bonds
- at least one inorganic or organic group and
- any long aliphatic chain or aromatic group or their combination, which are introduced so as to render the polymer lipophilic,
the result of these processes being that the above mentioned polymers form nanocavities, resulting from the internal chains of the dendrimers and also from the external aliphatic chains, which are introduced on the surface of the dendrimers and of the hyperbranched polymers,
due to the flexibility of the chains organic pollutants having a diversity of sizes and shapes, including shapes bigger than 11 Å, can be encapsulated in the nanocavities,
while polymers can be regenerated from the pollutants that they have encapsulated and they can be used again.

2. Modified dendrimeric polymers and modified non-symmetric hyperbranched polymers according to Claim 1 where the atom of a chemical element able to form three or four chemical bonds is nitrogen or appropriate characteristic group.

3. Modified dendrimeric polymers and modified non-symmetric hyperbranched polymers according to Claim 1 where the inorganic or organic linking group is aromatic or aliphatic or their combination.

4. Modified dendrimeric polymers and modified non-symmetric hyperbranched polymers according to Claim 1 where the long aliphatic chain which is introduced to render the polymer lipophilic is a normal aliphatic chain with more than eight carbon atoms.

5. Modified dendrimeric polymers, according to Claim 1 which are diaminobutane poly(propylene imino) dendrimers modified with lipophilic segments.

6. Modified non-symmetric hyperbranched polymers according to Claim 1 which are derivatives that result from the polycondensation of succinic, pthalic or tetrahydropthalic anhydride with diisopropanolamine.

7. Method for the synthesis of modified dendrimeric polymers and non- symmetric modified hyperbranched polymers according to Claims 1 to 6, which is characterized by the introduction to them of aliphatic chains, through alkylation, which render them lipophilic.

8. Method for the preparation of modified symmetric dendrimeric polymers and modified non-symmetric hyperbranched polymers according to Claims 1 to 6, which are characterized in that the above mentioned polymers are bound through aliphatic or rigid aromatic spacers that render these polymers lipophilic and the formation of polymeric networks based on the starting dendrimeric or hyperbranched polymer with appropriate reactants as diepoxides, di-isocyanate derivatives or diacylhalides.

9. Use of modified dendrimeric polymers and modified non-symmetric hyperbranched polymers of Claims 1 to 6 for the encapsulation in their nanocavities of organic pollutants of diversified molecular weights and shapes that are found in water and their concentration decrease at the level of a few ppb.

10. Use of modified symmetric dendrimeric polymers and non-symmetric hyperbranched polymers of Claims 1 to 6 according to which the product of synthesis of the above mentioned modified polymers is added in powder form to the water under purification, subsequently the water is stirred and the formulation which has encapsulated organic pollutants is removed by filtration or centrifugation or their combination.

11. Use of modified symmetric dendrimeric polymers and non-symmetric hyperbranched polymers of Claims 1 to 6 according to which a thin film, prepared from the product of synthesis of the above mentioned modified polymers, is covering a container in the interior of which water for purification is added.

12. Use of modified dendrimeric polymers and non-symmetric hyperbranched polymers of Claims 1 to 6 according to which the product of synthesis of the above mentioned polymers is required to be employed for application to systems used for the purification of water.